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A REVISED INDEX NUMBER FOR MEASURING THE RISE IN PRICES

THE accompanying diagrams (pp. 756–7) disclose the fluctuations in commodity prices as registered by the Gibson index numbers. The Gibson Index [1] is designed to continue the Dun series, which ceases with the number for May, 1907. The diagrams represent (1) the annual averages as furnished by Dun's Review for the years 1890 to 1906 inclusive, continued to 1909 by the Gibson numbers; and (2) beginning with 1907 the Gibson index numbers are plotted monthly. The remarkable rise in prices following the election of President Taft to the Presidency amounts to more than 15 per cent.

The Dun system of computing index numbers makes use of constant ratios for the primary groups. Thus, foods were weighted 50 per cent, clothing 18 per cent, minerals 16 per cent, and other commodities 16 per cent. This weighting was adopted originally as an approximate expression of the so-called Engel's Law. The Dun numbers were based on the prices of some three hundred and fifty articles, more or less, and, inasmuch as the method of compiling within the groups is not known, it was necessary to proceed along a general line of reasoning in order to arrange a formula for an approximate reproduction. Prices may be classified as primary and derivative. The prices of commodities, essentially more primary in their nature, are influenced by many independent causes. Derivative prices result in the vast number of finished products. The prices of derivative products are produced to a considerable extent by the prices of one or more primary commodities. The larger the list of random commodities, the greater is the weighting by a few primary commodities which are often active in many derivative products. I have therefore reduced the number of articles from more than three hundred and fifty to fifty.

[1] Published weekly by Thomas Gibson, Corn Exchange Bank Building, New York City

The commodities which are common in the lists used by various makers of index numbers are the important products of all nations. The Sauerbeck list furnishes an excellent starting point, if the selection is modified in the manner suggested by Forbes, in order to eliminate some of Sauerbeck's relatively obsolete commodities. The list of Sauerbeck was hence adopted as a basis, and certain modifications suggested by Forbes were introduced. Having selected a list of important commodities, the table of relative prices issued by the U. S. Bureau of Labor has been used. But changes, both eliminations and substitutions, were made. For instance, the following articles used by Sauerbeck were dropped as relatively less important so far as American conditions are concerned: —

Flax	Olive oil
Hemp	Soda crystals
Tin	Nitrate of soda
Tallow	Indigo
Palm oil	

After careful consideration of the various problems involved, such as the importance of the article, independent *vs.* derivative value, continuous quotations, group weighting, and uniformity of grade, the following fifty articles seemed the more desirable ones to include. The list is given in comparison with Sauerbeck's selection.

SAUERBECK		NEW GIBSON	Relative Price, January, 1907
Vegetable Foods			
1. Wheat, English Gazette		1. Wheat, contract price	97.1
2 Wheat, American	S	2. Wheat flour, spring patents	95.1
3. Flour, town made, white		3 Wheat flour, winter patents	86.0
4. Barley, English Gazette		4 Barley, by sample	119.7
5. Oats, English		5 Oats, cash	129.6
6 Maize, English mixed		6. Corn, No 2, cash	108.4
	A	7. Corn meal, fine yellow	127 8
7 Potatoes, good English		9 Potatoes, Burbank	78 6
8. Rice, Rangoon cargoes	S	8 Rye, No 2	116 9
16. Sugar, 2 grades		10 Sugar, 89 deg , fair refining	88.8
17. Sugar, Java, f. c.		11. Sugar, 96 deg., centrifugal	90 9
18 Coffee, 2 grades		12 Coffee, Rio, No 7	54 3
19 Tea, 2 grades		13 Tea, Formosa fine	81.0

Animal Foods

9. Beef, prime	14. Beef, steers	122 6
10. Beef, middling	15. Beef, fresh native sides	105.7
	A 16. Beef, salt	110.7
11. Mutton, prime	17. Mutton, sheep	129.3
12 Mutton, middling	18 Mutton, dressed	114.1
13 Pork, av large and small	19 Pork, hogs	149.1
14. Bacon, Waterford	20. Bacon	144.2
	A 21 Hams	133.4
15. Butter, Friesland fine and		
finest	22 Butter	138 8
		2422.1

Textiles

27. Cotton, middling uplands	23. Cotton, middling uplands	139.9
28 Cotton, fair Dhollerah	24 Cotton, yarns, cones 10/1	136.8
	A 25 Cotton, yarns, cones 22/1	127.0
29. Flax, 2 grades	Omitted	
30 Hemp, 2 grades	Omitted	
31 Jute, good medium	26 Jute, raw	237.1
32 Wool, 2 grades	27. Wool, Ohio, fine fleece	125 1
33. Wool, English Lincoln	28. Wool, Ohio, medium	115.5
	A 29. Worsted yarns, 2 40 Aus-	127.7
	tralians	
34. Silk, Tsatlee	30 Silk, Italian	125 6
	A 31. Silk, Japan filatures	127.3
		1264 0

Minerals

20 Iron, 2 grades	32 Pig iron	190 3
21. Iron, bars	33. Bar-iron, Pittsburg best re-	
	fined	132 1
	A 34 Cement	94 9
22. Copper, Chile bars	35 Copper, ingot, Lake	193.5
	A 36 Copper, sheet, hot-rolled	174.8
23. Tin, Straits	Omitted	
24. Lead, English pig	37. Lead, pig	165 4
25. Coal, Wallsend	38 Coal, anthracite	132 7
26 Coal, av. export price	39. Coal, bituminous, East	116 7
	A 40 Coal, bituminous, West	124.4
		1324.8

Other Materials

35 Hides, 3 grades		41. Hides, green salted	173.6
36. Leather, 2 grades		42. Leather, sole, hemlock B. A.	135.4
37. Tallow		Omitted	
38. Oil, Palm		Omitted	
39. Oil, Olive		Omitted	
	A 43	Oil, Cottonseed	133 0
40 Oil, Linseed	44	Oil, Linseed	90.4
	A 45	Petroleum, crude	173.6
41. Petroleum	46.	Petroleum, refined	130.9
42 Soda crystals		Omitted	
43. Nitrate of soda		Omitted	
44 Indigo, Bengal blue		Omitted	
	47	Rubber, Para Island	147.4
45 Timber, 2 grades	48.	Timber, spruce	174 2
	A 49.	Timber, yellow pine	165.2
	A 50	Paper	85 0
			1408 7

S = substituted.
A = added.

The figures given in the last column illustrate the method of the computation. They indicate the relative prices of the various commodities for January, 1907. The base number 100 for each commodity is the average price of the given commodity for the years 1890–1899 inclusive. Relative prices of some two hundred and fifty articles are to be found in the tables of the U. S. Bureau of Labor. These were planned originally by the late Honorable Carroll D. Wright, and it was his expectation that they would be of value in later years for the computation of index numbers according to such systems as economists found suitable for the nature of the study in hand.

The sums of the relative prices of all foods, textiles, minerals, and other materials are entered by groups. Thus, the total for foods is 2422.1, textiles 1264.0, minerals 1324.8, and other materials 1408.7.

The method of computing the final index number is shown below. The sums of the groups, as above, are entered in the first column. The multipliers for each group are given in the second column. The sum of the weighted products

is the index number, which reproduces the old Dun number within close limits.

		Multipliers	Weighted Product
Foods	2422.1	1 9159	46 4050
Textiles	1264 0	1.6860	21 3010
Minerals	1324 8	1 4987	19.8548
Other	1408 7	1.3488	19 0005

Gibson Index Number	106.5613
Dun's Index Number	107 2640
(For the same month, Jan. 1907)	
Difference	000 7027

The multipliers are obtained from the formula $\dfrac{W. \times D.}{C}$ for each grouping, in which W = the Dun weighting, 0.50 for foods, 0.18 for textiles, 0.16 for minerals; and 0.16 for other commodities, D = average 1890–1899, Dun numbers, namely 0.843, and C = number of commodities in the group.

In sum, it would appear that the commodities included are independent to a considerable extent. Several commodities included introduce world causes of price fluctuation. We have in sugar 89', sugar 96', coffee Rio No. 7, tea Formosa, jute, worsted yarns, wool, silk Japan, silk Italian, hides, leather, rubber, and paper, at least fifteen articles which are not moved by causes originating in the United States to an overwhelming extent. In the thirty or more other commodities, many great industries are represented by the principal staples.

The following table shows the weights which have been adopted by the makers of other index numbers for the principal groups which make up the cost of living. Figures of expenditures are given for family budgets contained in the report of the Commissioner of Labor for 1891. How radically the Bureau of Labor Index Number differs from other systems is apparent. Food is given 26 per cent and clothing 29 per cent weights, in comparison with 42 per cent and 18 per cent by Sauerbeck, and 37 per cent and 10 per cent by Bradstreet.

Groups	Average for Incomes under $700	Sauerbeck's Index Number England	Gibson Index Number	Dun Index Number	Norton Sauerbeck Index U S	Bradstreet's Selection	Bureau of Labor Index Number	Average for Incomes above $700
Foods	47%	42%	50%	50%	44%	37%	26%	34%
Clothing	14	18	18	18	18	10	29	16
Other	39	40	32	32	38	53	45	50

The above method reproduces the Dun index numbers more or less accurately. The Gibson index numbers are more sensitive. The range of fluctuation is slightly wider. I have not computed comparisons for all years. The following comparisons serve to indicate the extremes of the range.

|		Gibson	Dun	Difference
1896 (low year)		72 2	74 3	−2 1
1907 (high period)	Jan.	106 6	107 3	−0 7
	Feb	108 0	107 4	+0 6
	Mar	109.4	109 9	−0 5

The average differences for the above comparisons are one per cent.

The Dun and Gibson index numbers covering the period appear in the following tables, and the diagrams which follow represent the results graphically.
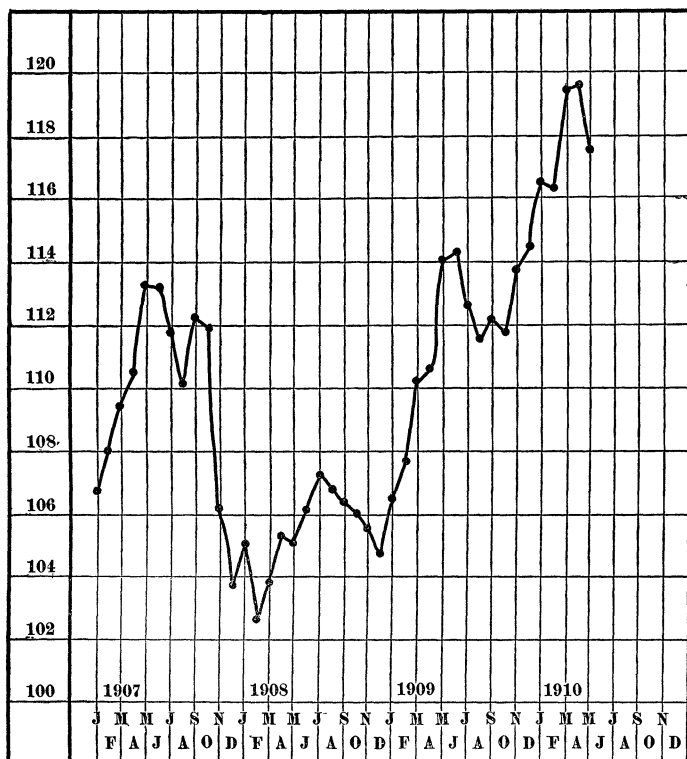
DUN AND GIBSON INDEX NUMBERS.
BY YEARS, 1890–1909.

1890	91.6	1897	72 5	1904	97 2
1891	96 1	1898	77 8	1905	98 3
1892	90 0	1899	85 2	1906	105 2
1893	90 6	1900	91 4	1907	109 9
1894	83 3	1901	91 5	1908	105 5
1895	81.5	1902	101 9	1909	111.9
1896	74 3	1903	99 5		
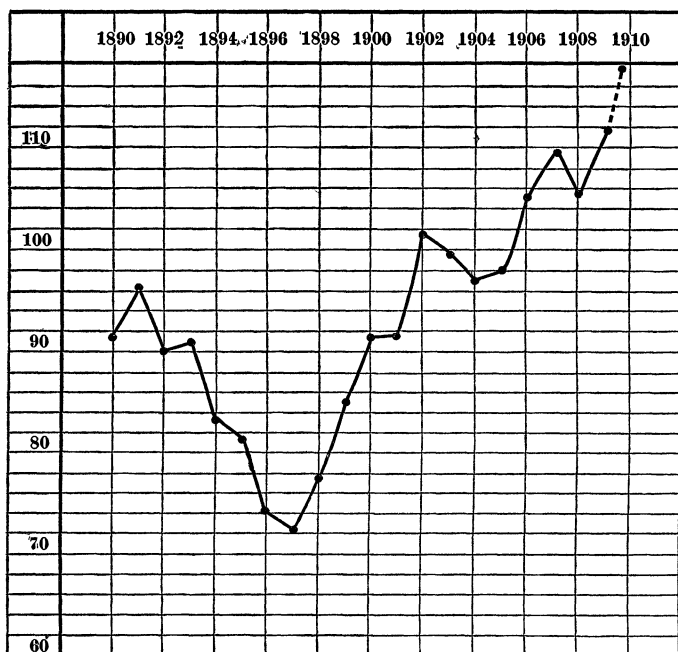
The diagram is based on the Dun index numbers for the years 1890 to 1906 inclusive, and the Gibson index numbers for 1907 to 1909 inclusive   The last entry is for the first six months of 1910

The net recovery from the crisis of 1893, measuring from the low year 1897, when the number registered 72 5, to the year 1909, 111 9, is 39 4 points or 54 3%   The advance of the average for the first six months of 1910 is 5% over 1909   The total recovery from 72 5 in 1897 to the high point 120 5 for the week ending April 9, 1910, is 48 0 points or 66 2%   In other words, the purchasing of the 1897 dollar has been reduced to 60 cents

The diagram based on the Gibson index numbers from January, 1909, to May, 1910, inclusive, shows the violent fall in commodity prices in 1907, and the subsequent advance

From October, 1907, to February, 1908, the index fell from 112 0 to 102 8, or 8 2% The fall between October and November, 1907, the months of the Crisis of 1907, was 5%

The recovery commencing with November, 1908, carried the index from 105 5 to 119 7 for April, 1910, in all 13 5%. The total advance from the low point in February, 1908 (102 8) to 120 5 for the week ending April 9, 1910, was 17 7 points, or 17 2% This rise probably passes all records for rapidity. It is especially significant, coming as it does on the top of ten years of continually rising prices

DUN AND GIBSON INDEX NUMBERS.

BY MONTHS, JAN., 1907, TO MAY, 1910.

1907	Jan.	106.6	1908	Mar.	103.9	1909	May	114.1
	Feb.	108 0		Apr.	105.4		June	114.4
	Mar.	109 4		May	105.3		July	112 8
	Apr	110 6		June	106 2		Aug	111.4
	May	113 4		July	107.3		Sept.	112.3
	June	113 4		Aug	106.7		Oct.	111.8
	July	111 8		Sept.	106.3		Nov.	113.8
	Aug.	110 2		Oct.	106 0		Dec.	114.6
	Sept.	112 4		Nov.	105 5	1910	Jan.	116 8
	Oct.	112.0		Dec.	104.7		Feb.	116 6
	Nov.	106.2	1909	Jan.[1]	106.7		Mar.	119.6
	Dec.	103.8		Feb	107 7		Apr.	119.7
1908	Jan	105.0		Mar.	110.4		May	117 7
	Feb.	102 8		Apr.	110.7			

The Gibson index numbers are interesting to the economist for the following reasons: —

(1) For a great many years, the Dun index numbers had the approval of the business world. Because a constant weighting for the groups was maintained, irrespective of the number of commodities in the group, they were based on an approximately scientific conception of the important factors of the cost of living.

(2) The Gibson index numbers may be compared with the Dun series which go back four or five decades.

(3) The method of computation provides a way of supplying the index numbers in the future, in case the calculation of the numbers should be discontinued at any time by the present publisher. The statistics of relative prices are usually published by the Bureau of Labor in the March Bulletin. The task of computing the number, once the relative figures are given, is light. The difficulty in such cases of reproducing index numbers generally lies in collecting from scattered sources reliable statistics.

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[1] Statistics collected from trade journals were used from January, 1909, to compute relative prices, the Bureau of Labor had published no figures since December, 1908.

(4) The composition of the number, considered in the light of the statistical quality and importance of the articles, is excellent. The composition may be compared with that of the Sauerbeck index by stating that 76 per cent of the articles of Sauerbeck are identical in nature with 68 per cent of the articles of this series. The commodities which are common to the two lists are as follows: —

Wheat	Tea	Cotton	Lead
Flour	Beef	Jute	Coal
Barley	Beef	Wool	Coal
Oats	Mutton	Wool	Hides
Corn	Mutton	Silk	Leather
Potatoes	Pork	Iron	Linseed oil
Sugar	Bacon	Iron	Petroleum
Sugar	Butter	Copper	Timber
Coffee	Cotton		

A cursory reading indicates that the industries represented are basic, and the commodities leading factors in the cost of living.

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METHOD OF TAXING THE UNEARNED INCREMENT

THE main contention of Professor Davenport in his article on " The Single Tax in the English Budget," [1] that the single taxers should logically advocate a tax on land rentals rather than on land values, is undoubtedly correct. In their use of phrases they have been influenced by their leader, who proposed " to abolish all taxation save those upon land values." How careless George sometimes was

[1] Quarterly Journal of Economics, February, 1910 Two typographical errors in the article may be noted. On p. 283, line 29, " ten per cent " should read " ten dollars " Lines 2, 3, 4 of page 284 should read " a tax of $47 619 would leave a net unappropriated rental of $2 381, itself a basis for a value of $47 619 "